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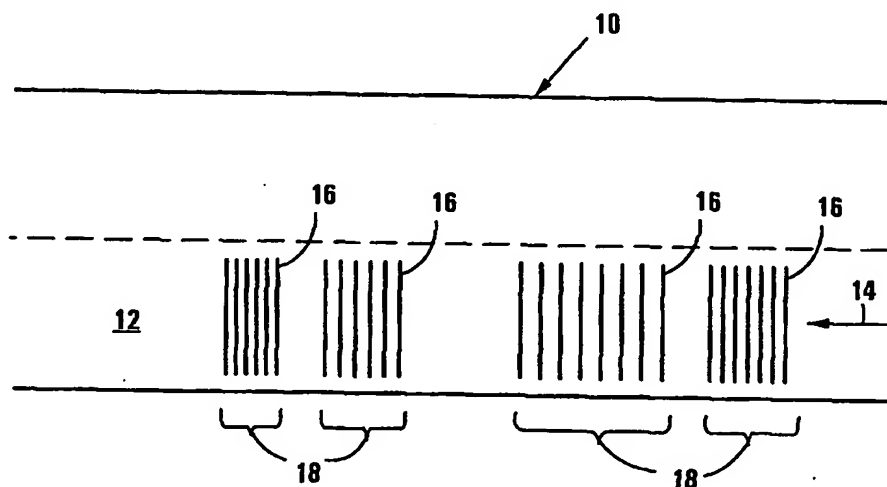
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ning of each regular issue of the PCT Gazette.

(54) Title: A SOUND GENERATING DEVICE



(57) Abstract: The invention relates to a method of generating sound which includes providing a road surface (12) configured such that a vehicle wheel driving over the road surface (12) generates a predetermined sequence of sounds. The sequence of sounds may be a melody. The method may include providing irregularities in the form of ribs or ridges which extend transversely relative to the intended direction of travel of a said vehicle wheel and which are longitudinally spaced apart on the road surface to generate the sequence of sounds. The irregularities may be arranged in longitudinally spaced apart sets, each set comprising a plurality of longitudinally spaced apart irregularities configured to generate a predetermined sound of predetermined duration when a vehicle wheel travels over the ridges at a predetermined speed. The invention extends to a method of arranging rumble strips on a road, to a road, to a rumble strip arrangement and to a portable sound generating device.



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A SOUND GENERATING DEVICE

THIS INVENTION relates to roads. More particularly it relates to a method of generating sound. It also relates to a method of arranging rumble strips and to an arrangement of irregularities on a road.
5 It further relates to a road, to a portable sound generating arrangement and to an installation.

According to one aspect of the invention there is provided a method of generating sound which includes providing on a road a sound generating arrangement configured such that a vehicle wheel
10 driving over the sound generating arrangement generates a predetermined sequence of sounds.

The method may include providing irregularities on the road configured to generate the predetermined sequence of sounds. The irregularities may be in the form of ribs or ridges which extend
15 transversely relative to the intended direction of travel of a said vehicle wheel and which are longitudinally spaced apart. In other embodiments, the irregularities may be in the form of depressions, grooves, embedded features, or the like.

The method may include the step of arranging the
20 irregularities in longitudinally spaced sets, the irregularities in each set being configured so that the sounds generated by the sets have a desired relative frequency and duration. Naturally, this assumes that a vehicle

wheel driving over the irregularities will be moving at a more-or-less constant speed.

In a preferred embodiment of the invention the sequence of sounds generated is in the form of a melody, e.g. an advertising jingle.

5 The method may include arranging the irregularities in two transversely spaced groups, each group comprising a plurality of longitudinally spaced irregularities positioned such that the wheels on the left hand side of a vehicle travelling along the road pass over the one group of irregularities and the wheels on the right hand side of the
10 vehicle pass over the other group of irregularities.

In one embodiment of the invention the method may include providing the irregularities as an integral part of a surface of the road, e.g. in the form of rumble strips.

15 In another embodiment of the invention the method may include securing the irregularities on the road so that they are removable therefrom.

The method may include the prior step of determining the desired arrangement of irregularities analytically.

20 According to another aspect of the invention there is provided a method of arranging rumble strips on a road which includes arranging the rumble strips so that a vehicle wheel passing over the rumble strips generates a predetermined sequence of sounds.

The method may include arranging the strips in longitudinally spaced apart sets, each set comprising a plurality of longitudinally spaced apart strips configured so that the sounds generated by the sets of rumble strips have a desired relative frequency and duration.

The method may include arranging the rumble strips in two transversely spaced groups each group comprising a plurality of longitudinally spaced apart rumble strips positioned such that the wheels on the left hand side of a vehicle travelling along the road pass over the one group of rumble strips and the wheels on the right hand side of the vehicle pass over the other group of rumble strips.

The spacing between strips in the sets may differ to provide a stereo effect. For example, the strips over which a left wheel of the vehicle passes may be about 20 mm apart and the strips over which a right wheel of the vehicle passes may be about 15 mm apart.

Different sounds may be achieved by varying the spacing between the rumble strips and/or varying the material and/or other physical characteristics, e.g. shape and/or size, of the rumble strips.

The sequence of sounds may be in the form of a melody, e.g. an advertising jingle.

The method may include the prior step of determining the desired arrangement of rumble strips analytically.

According to yet another aspect of the invention there is provided an arrangement of irregularities on a road, the arrangement being configured such that a vehicle wheel driving over the irregularities generates a predetermined sequence of sounds.

- 5 The irregularities may be elongate, longitudinally spaced apart and extend transversely relative to the intended direction of travel of a said vehicle wheel.

The irregularities may be arranged in longitudinally spaced apart sets.

- 10 The spacing between the irregularities in at least two of the sets of irregularities may differ.

The number of irregularities in at least two sets of irregularities may differ.

- 15 Each set may comprise a plurality of longitudinally spaced apart irregularities configured so that the sounds generated by the sets of irregularities have a desired relative frequency and duration.

The arrangement of irregularities may include two transversely spaced groups of irregularities, each group comprising a plurality of longitudinally spaced irregularities.

- 20 The sequence of sounds may be in the form of a melody.

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According to still another aspect of the invention there is provided a road having a road surface configured such that a vehicle wheel driving over the road surface generates a predetermined sequence of sound.

5 The road surface may include a plurality of irregularities configured to generate the predetermined sequence of sound. The irregularities may be in the form of ribs or ridges which extend transversely relative to the intended direction of travel of a said vehicle wheel and which are longitudinally spaced apart.

10 According to still yet another aspect of the invention there is provided a road which includes an arrangement of irregularities of the type described above provided thereon.

The ridges may be fast with the road.

Instead, the ridges may be removable.

15 The ridges may be of metal. Naturally, other materials can be used to optimise the tonal quality of the sound which is generated.

 According to a further aspect of the invention there is provided a portable sound generating arrangement which is transportable to and can be positioned on a road at a desired location and is configured
20 to generate a predetermined sequence of sounds when a vehicle wheel is driven over the arrangement.

The arrangement may include a plurality of interconnected sound generating elements and securing means for securing the arrangement in position on a road with the sound generating elements at a predetermined spacing.

- 5 The arrangement may be elongate and the sound generating elements may be in the form of longitudinally spaced transversely extending elongate elements which are connected together by connection means.

- 10 According to a still further aspect of the invention there is provided an installation which includes

a sound generating arrangement provided on a road and configured such that a vehicle wheel driving over the sound generating arrangement generates a predetermined sequence of sounds; and

- 15 a visual display which is positioned relative to the sound generating arrangement so that matter displayed thereon is visible to an occupant of a said vehicle at the same time as the predetermined sequence of sounds is generated.

The sound generating arrangement may include a plurality of irregularities provided on the road.

- 20 The irregularities may be defined by a surface of strips on the road surface.

The arrangement of irregularities may be formed by a portable sound generating arrangement which is secured on the road.

The information presented on the visual display may relate to advertising, e.g. of products or services, the sequence of sounds being a melody associated with the advertising.

The visual display may be a billboard.

5 The invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings.

In the drawings,

Figure 1 shows a plan view of part of a road in accordance with the invention;

10 Figure 2 shows, on an enlarged scale, a longitudinal sectional elevation of part of the road in accordance with the invention;

Figure 3 shows another embodiment of a the road in accordance with the invention;

15 Figure 4 shows a plan view of a portable sound generating arrangement in accordance with the invention, the arrangement being secured to a road; and

Figure 5 shows a three-dimensional view of an installation in accordance with the invention.

20 In Figures 1 and 2 of the drawings, reference numeral 10 generally indicates a road in accordance with the invention. The road 10 has a surface 12 along which a vehicle is intended to drive in the direction of arrow 14.

The road 10 includes a plurality of irregularities in the form of ribs or ridges 16, which extend transversely across the surface 12 and which are longitudinally spaced apart relative to the arrow 14.

5 The ridges 16 are arranged in a plurality of longitudinally spaced apart sets 18. Each set 18 comprises a plurality of longitudinally spaced apart ridges 16 configured such that when a vehicle wheel passes over the ridges 16 in a set 18 at a predetermined speed, a predetermined sound is generated.

10 The Inventor believes that the arrangement of ridges 16 and sets 18 can be determined analytically once some base line information has been obtained.

The Inventor believes that for a given vehicle speed the frequency and hence the pitch of the sound generated will be inversely proportional to the spacing between the strips. The duration of a sound
15 will be determined by the total length of a set 18 in the direction of travel of the vehicle, coupled with the vehicle speed.

In this regard, in a test carried out by the Inventor, ridges 16 were formed by securing pine strips having a width W of approximately 51 mm (2 inches) in position on a road surface. Tests
20 were conducted with thirty strips secured to the road surface and spaced apart 20 cm.

A reliable sample was achieved with the 20 cm spacing and a sound recording was taken with the strips spaced apart 20 cm.

The Inventor then determined the desired pitch or frequency as a percentage of the pitch or frequency obtained making use of the 20 cm spacing.

This was then directly converted into a spacing between the strips, e.g. a sound having a frequency which is almost double that of the sound generated using the 20 cm spacing would require the strips to be spaced apart at 10 cm. The strips were arranged in the calculated spacing and the sound monitored. The Inventor has found that the sound generated by the strips arranged in the spacing calculated in the manner described above did in fact provide a sound of the desired pitch.

In a second experiment, the Inventor made use of strips in the form of 16 mm round iron bars which were secured in position on the road. The Inventor once again found that the particular spacing in order to generate a particular pitch could be calculated. Further, the Inventor found that the sound generated by a wheel driving over the iron bars was of an improved tonal quality than that generated by the wooden strips.

The Inventor then calculated the desired spacing as well as the number of ridges 16 which will be required in a set to produce a note of a particular frequency and duration. This was done for a predetermined sequence of notes and the ridges 16 were then arranged in sets 18 which were spaced apart at desired intervals corresponding to the spacing between the predetermined notes, the spacing of the ridges 16 in each set 18 and the number of ridges 16 corresponding to the desired note and duration thereof. The Inventor then found that by driving a vehicle over the road surface 12 on which the ridges 16 were

mounted a predetermined sequence of sounds were generated. In particular, the Inventor generated a melody in the form of an advertising jingle.

As the pitch of the sound generated by a set 18 is partly
5 determined by the speed of travel of the vehicle, the Inventor believes that it may be preferable to position the ridges 16 at a location on the road where the speed of travel of any vehicles using the road is fairly predictable. Nevertheless, the predetermined arrangement of the ridges 16 ensures that the sounds generated by the sets of ridges have a fixed
10 relative frequency and duration, regardless of the speed of the vehicle thereby permitting a known melody, e.g. an advertising jingle, to be recognised even if the key is different to the usual key of the melody.

It will be appreciated that the material and configuration of the ridges 16 can vary as desired. Hence, they could be of wood or
15 metal as mentioned above. Instead, they may be in the form of rumble strips which are integral with the road.

Figure 3 of the drawings shows a further embodiment of a road 100 in accordance with the invention, with like reference numerals referring to like parts. In this embodiment, the ridges 16 are not only
20 arranged in longitudinally spaced apart sets, but also in two transversely spaced groups 18.2, 18.4.

When a vehicle, in use, travels over the road surface 12 a left wheel of the vehicle travels over one of the groups 18.4 and a right wheel travels over the other group 18.2. An occupant of the vehicle will
25 experience the sounds generated by the respective wheels travelling over

their associated groups of ridges as coming from different sides of the vehicle, thereby creating a stereo effect.

5 If the spacing between the ridges 16 of two transversely spaced sets (e.g. 18.2 and 18.4) differs, the pitch of the sound generated by the left wheel of the vehicle will differ from the pitch of the sound generated by the right wheel of the vehicle. The spacing between the ridges 16 can be arranged such that these sounds are in harmony. Instead, the ridges 16 of two transversely spaced groups may be equally spaced, but the ridges of one set 18.8 may slightly lag the ridges 16 of
10 its corresponding set 18.9. In use, this produces a slight delay between the sounds generated by the left and right wheels of the vehicle respectively, enhancing the stereo effect.

Instead of being permanent fixtures on a road surface, the irregularities can be defined by a portable sound generating arrangement
15 110 (Figure 4). The sound generating arrangement 110 includes a plurality of steel bars 116 arranged in a plurality of sets 118, the bars being interconnected by connection means in the form of two transversely spaced chains 120. The arrangement 110 also includes securing means in the form of nails 130 which can be driven into a road
20 111, each nail 130 being shaped and dimensioned such that a shank of the nail 130 can pass through a link of the chain 120.

In use, the sound generating arrangement 110 is secured to the road 111 by positioning the arrangement 110 on the road surface 112 such that the bars 116 are transverse to the intended direction of
25 travel 14 of a vehicle, passing a nail 130 through a link at each extremity of each chain 120, and driving the nails into the road 111. In this

condition, the bars 116 of the arrangement 110 form an arrangement of irregularities on the road surface such that a predetermined sequence of sounds is generated when a vehicle wheel passes over the arrangement 110.

5 In this way, the sound generating arrangement can be transported to a desired location and secured in position where the predetermined sequence of sounds is generated.

Referring now to Figure 5 of the drawings, reference numeral 210 generally indicates an installation in accordance with the invention. The installation 210 includes a visual display in the form of an advertising billboard 220, which presents information 222 in the form of an advertisement, e.g. for a particular product. The arrangement 210 also includes an arrangement of irregularities on a surface 212 of a road 211 in the form of transversely extending ridges 216. As before, the ridges 216 are arranged in longitudinally spaced apart sets 218 so that a predetermined sequence of sounds is generated when a vehicle wheel is driven over the sets 218. In this case, the predetermined sequence of sounds is an advertising jingle which can be associated with the advertised product or with a company that sells the product.

20 In use, occupants of a vehicle which is driven over the arrangement of ridges 216 are able to see the advertisement on the billboard 220, and at about the same time hear the associated advertising jingle, thereby reinforcing the advertising message. In this manner, more attention may be drawn to the advertisement on the billboard 220 than would normally have been the case.

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The Inventor believes that a road surface or device in accordance with the invention will be capable of generating a range of sounds which can be arranged in a predetermined sequence, typically in the form of an advertising jingle, which will provide organisations with

5 additional scope to advertise their product.

CLAIMS:

1. A method of generating sound which includes providing on a road a sound generating arrangement configured such that a vehicle wheel driving over the sound generating arrangement generates a predetermined sequence of sounds.
5
2. A method of generating sound as claimed in claim 1, which includes providing irregularities on the road configured to generate the predetermined sequence of sounds.
3. A method of generating sound as claimed in claim 2, which
10 includes the step of arranging the irregularities in longitudinally spaced sets, the irregularities in each set being configured so that the sounds generated by the sets have a desired relative frequency.
4. A method of generating sound as claimed in claim 2 or claim 3, wherein the sequence of sounds generated is in the form of a melody.
- 15 5. A method of generating sound as claimed in any one of claims 2 to 4, inclusive, which includes arranging the irregularities in two transversely spaced groups, each group comprising a plurality of longitudinally spaced irregularities positioned such that the wheels on the left hand side of a vehicle travelling along the road pass over the one
20 group of irregularities and the wheels on the right hand side of the vehicle pass over the other group of irregularities.

6. A method of generating sound as claimed in any one of claims 2 to 5, inclusive, which includes providing the irregularities as an integral part of a surface of the road.
7. A method of generating a sound as claimed in any one of claims 2 to 5, inclusive, which includes securing the irregularities on the road so that they are removable therefrom.
8. A method of generating sound as claimed in any one of claims 2 to 7, inclusive, which includes the prior step of determining the desired arrangement of irregularities analytically.
- 10 9. A method of arranging rumble strips on a road, which includes arranging the rumble strips so that a vehicle wheel passing over the rumble strips generates a predetermined sequence of sounds.
- 15 10. A method of arranging rumble strips on a road as claimed in claim 9, which includes arranging the strips in longitudinally spaced apart sets, each set comprising a plurality of longitudinally spaced apart strips configured so that the sounds generated by the sets of rumble strips have a desired relative frequency.
- 20 11. A method of arranging rumble strips on a road as claimed in claim 9 or claim 10, which includes arranging the rumble strips in two transversely spaced groups each group comprising a plurality of longitudinally spaced apart rumble strips positioned such that the wheels on the left hand side of a vehicle travelling along the road pass over the one group of rumble strips and the wheels on the right hand side of the vehicle pass over the other group of rumble strips.

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12. A method of arranging rumble strips on a road as claimed in any one of claims 9 to 11, inclusive, wherein the sequence of sounds is in the form of a melody.
13. A method of arranging rumble strips on a road as claimed in any one of claims 9 to 12, inclusive, which includes the prior step of determining the desired arrangements of rumble strips analytically.
14. An arrangement of irregularities on a road, the arrangement being configured such that a vehicle wheel driving over the irregularities generates a predetermined sequence of sounds.
- 15 15. An arrangement of irregularities as claimed in claim 14, wherein the irregularities are elongate, longitudinally spaced apart and extend transversely relative to the intended direction of travel of a said vehicle wheel.
16. An arrangement of irregularities as claimed in claim 15, wherein the irregularities are arranged in longitudinally spaced apart sets.
17. An arrangement of irregularities as claimed in claim 16, wherein the spacing between the irregularities in at least two of the sets of irregularities differ.
- 20 18. An arrangement of irregularities as claimed in claim 16 or claim 17, in which the number of irregularities in at least two sets of irregularities differ.

19. An arrangement of irregularities as claimed in any one of claims 16 to 18, inclusive, in which each set comprises a plurality of longitudinally spaced apart irregularities configured so that the sounds generated by the sets of irregularities have a desired relative frequency and duration.

20. An arrangement of irregularities as claimed in any one of claims 15 to 19, inclusive, which includes two transversely spaced groups of irregularities, each group comprising a plurality of longitudinally spaced irregularities.

21. An arrangement of irregularities as claimed in any one of claims 14 to 20, inclusive, wherein the sequence of sounds is in the form of a melody.

22. A road having a road surface configured such that a vehicle wheel driving over the road surface generates a predetermined sequence of sounds.

23. A road which includes an arrangement of irregularities as claimed any one of claims 14 to 21, inclusive, provided thereon.

24. A road as claimed in claim 23, in which the irregularities are fast with the road.

25. A road as claimed in claim 23, in which the irregularities are removable.

26. A road as claimed in claim 25, in which the irregularities are of metal.

27. A portable sound generating arrangement which is transportable to and can be positioned on a road at a desired location
5 and is configured to generate a predetermined sequence of sounds when a vehicle wheel is driven over the arrangement.

28. A portable sound generating arrangement as claimed in claim 27, which includes a plurality of interconnected sound generating elements and securing means for securing the arrangement in position on
10 a road with the sound generating elements at a predetermined spacing.

29. A portable sound generating arrangement as claimed in claim 28, wherein the arrangement is elongate and the sound generating elements are in the form of longitudinally spaced transversely extending elongate elements which are connected together by connection means.

15 30. An installation which includes
a sound generating arrangement provided on a road and configured such that a vehicle driving over the sound generating arrangement generates a predetermined sequence of sounds; and
a visual display which is positioned relative to the sound
20 generating arranged so that matter displayed thereon is visible to an occupant of a said vehicle at the same time as the predetermined sequence of sounds is generated.

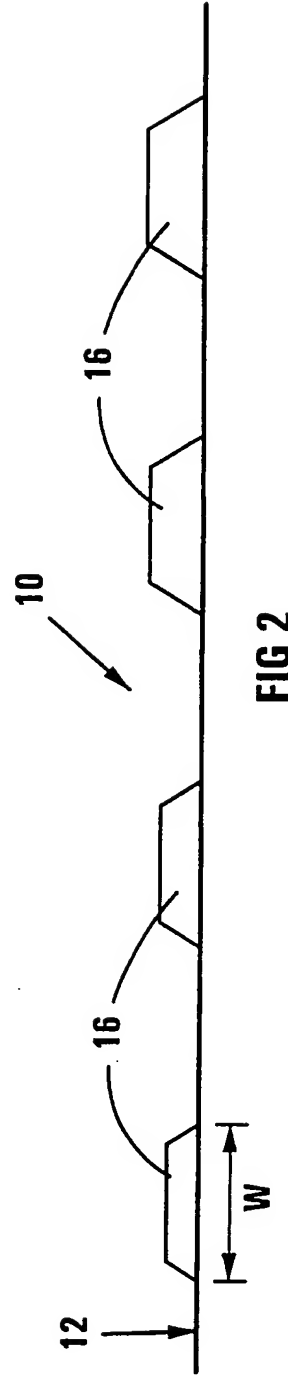
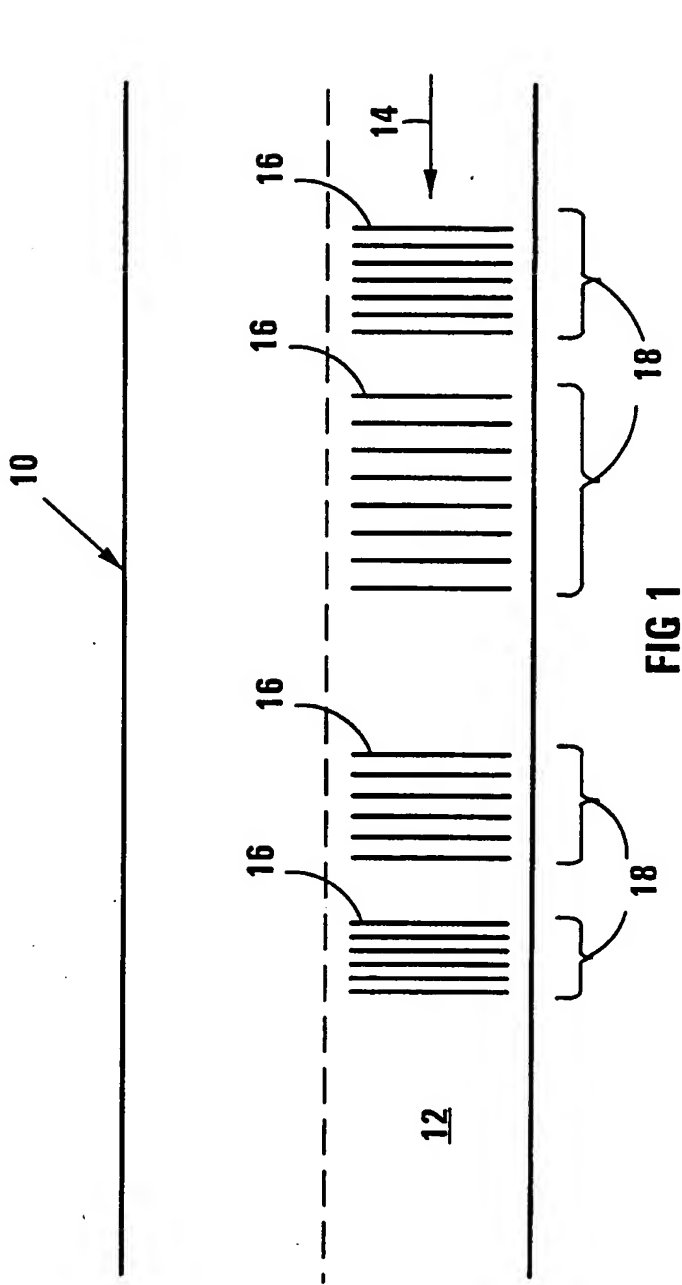
31. An installation as claimed in claim 30, wherein the sound generating arrangement includes a plurality of irregularities provided on the road.
- 5 32. An installation as claimed in claim 31, wherein the irregularities are defined by a surface of the road.
33. An installation as claimed in claim 31, wherein the arrangement of irregularities is formed by a portable sound generating arrangement which is secured on the road.
- 10 34. An installation as claimed in any one of claims 30 to 33, inclusive, wherein the information presented on the visual display relates to advertising, and the sequence of sounds is a melody associated with the advertising.
35. An installation as claimed in any one of claims 30 to 34, inclusive, wherein the visual display is a billboard.
- 15 36. A method of generating sound as claimed in claim 1, substantially as herein described and illustrated.
37. A method of arranging rumble strips on a road as claimed in claim 9, substantially as herein described and illustrated.
- 20 38. An arrangement of irregularities on a road as claimed in claim 14, substantially as herein described and illustrated.

39. A road as claimed in claim 22, substantially as herein described and illustrated.

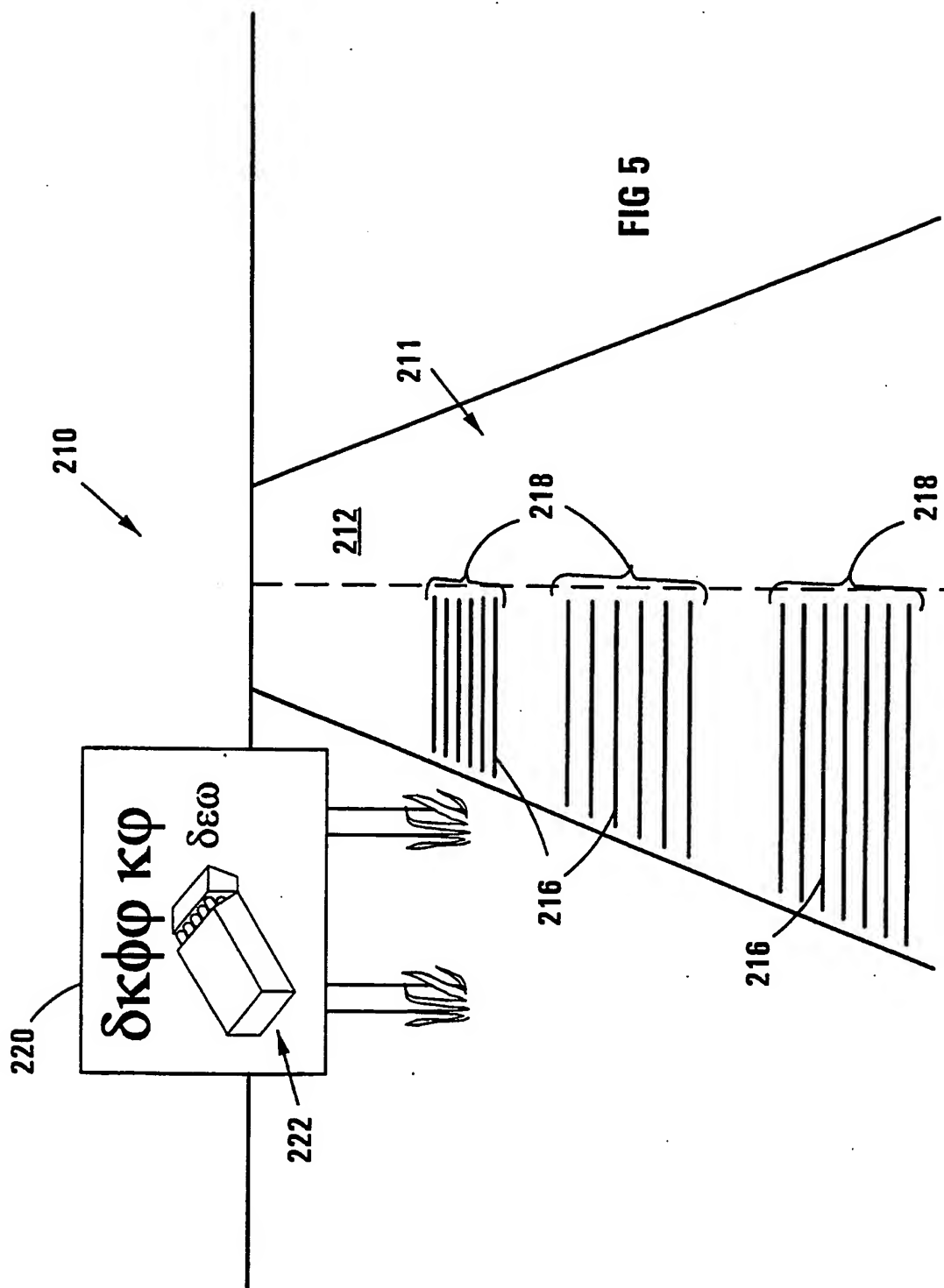
40. A portable sound generating arrangement as claimed in claim 27, substantially as herein described and illustrated.

5 41. An installation as claimed in claim 30, substantially as herein described and illustrated.

42. A new method of generating sound, a new method of arranging rumble strips on a road, a new arrangement of irregularities on a road, a new road, a new portable sound generating arrangement, or a
10 new installation, substantially as herein described.



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INTERNATIONAL SEARCH REPORT

Int: lonal tation No

PCT/ZA 00/00200

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E01F9/047

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 41 37 913 A (MEYER MICHAEL CONRAD DR ING) 19 May 1993 (1993-05-19) the whole document ---	1-25, 36-38, 42
X	FR 2 575 856 A (SCHMIDT ALEX) 11 July 1986 (1986-07-11)	1-6, 8-24, 36-39, 42
Y	page 1, line 9 - page 2, line 5	26
A	page 3, line 5 - line 12 page 5, line 8 - line 37; figures --- -/-	7, 25, 30-35

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

S document member of the same patent family

Date of the actual completion of the international search

6 February 2001

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Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/ZA 00/00200

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

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